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be conceded to those assuring for amounts under £100 both in the Class and Industrial Assurance Offices.

I have now fully entered into the details of the Government Bill, and answered, I trust satisfactorily, the objections that have been raised against it. I fear that much that I have said may be considered trite; but though I was well aware that many of my remarks might not be new to actuaries, yet, thinking that this paper might come into the hands of those, who are less informed upon the subject, I thought it desirable not to omit what might contribute to the proper understanding of life assurance as proposed to be undertaken by Government. Some of the particulars of the scheme may be open to improvement and revision; but in its general features I believe, if adopted, it will be productive of considerable benefit to the large mass of the working population.

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## *A Budget of Paradoxes. By* Professor De Morgan.

(Continued from page 284, vol. xi.)

An essay to ascertain the value of leases and annuities for years and lives. By W[eyman] L[ee]. London, 1737, 8vo.

A valuation of Annuities and Leases certain, for a single life. By Weyman Lee, Esq., of the Inner Temple. London, 1751, 8vo.. Third edition, 1773.

Every branch of exact science has its paradoxer. The world at large cannot tell with certainty who is right in such questions as squaring the circle, &c. Mr. Weyman Lee was the assailant of what all who had studied called demonstration in the question of annuities; and he can be exposed to the world: for his error arose out of his not being able to see that the whole is the sum of all its parts.

By an annuity, say of £100, now bought, is meant that the buyer is to have for his money £100 in a year if he be then alive; £100 at the end of two years, if then alive; and so on. It is clear that he would buy a life annuity if he should buy the first £100 in one Office, the second in another; and so on. All the difference between buying the whole from one Office, and buying all the separate contingent payments at different Offices, is immaterial to calculation. Mr. Lee would have agreed with the rest of the world about the payments to be made to the several different Offices, in consideration of their several contracts: but he differed from every one else about the sum to be paid to *one* Office. He contended that the way to value an annuity is to find out the term of years which the individual has an even chance of surviving, and to charge for the life annuity the value of an annuity certain for that term.

It is very common to say that Lee took the average life, or expectation, as it is wrongly called, for his term: and this I have done myself, taking the common story. Having exposed the absurdity of this second supposition, taking it for Lee's, in my *Formal Logic,* I will now do the same with the first.

A mathematical truth is true in its extreme cases. Lee's principle is that an annuity on a life is the annuity made certain for the term within which it is an even chance the life drops. If, then, of a thousand persons, 500 be sure to die within a year, and the other 500 be immortal, Lee's price of an annuity to any one of these persons is the present value of one payment: for one year is the term which each one has an even chance of surviving and not surviving. But the true value is obviously half that of a perpetual annuity: so that at 5 per cent., Lee's rule would give less than the tenth of the true value. It must be said for the poor circle-squarers, that they never err so much as this.

Lee would have said, if alive, that I have put an *extreme case:* but any *universal* truth is true in its extreme cases. It is not fair to bring forward an extreme case against a person who is speaking as of usual occurrences: but it is quite fair when, as frequently happens, the proposer insists upon a perfectly general acceptance of his assertion. And yet many who go the whole hog protest against being tickled with the tail. Counsel in court are good instances: they are paradoxers by trade. June 13, 1849, at Hertford, there was an action about a ship insured against a *total* loss: some planks were saved, and the underwriters refused to pay. Mr. Z. (for deft.), "There can be no degrees of totality; and some timbers were saved."—L.C.B. "Then if the vessel were burned to the water's edge, and some rope saved in the boat, there would be no total loss."—Mr. Z. "This is putting a very extreme case."—L.C.B. "The argument would go that length." What would *Judge* Z.—as he now is—say to the extreme case beginning somewhere between six planks and a bit of rope?

## No. VIII. 1754—1792.

Histoire des recherches sur la quadrature du cercle. . . . avec une addition concernant les problèmes de la duplication du cube et de la trisection de l'angle. Paris, 1754, 12mo. [By Montucla.]

This is *the* history of the subject. It was a little episode to the great history of mathematics by Montucla, of which the first edition appeared in 1758. There was much addition at the end of the fourth volume of the second edition; this is clearly by Montucla, though the bulk of the volume is put together, with help from Montucla's papers, by Lalande. There is also a second edition of the history of the quadrature, Paris, 1831, 8vo., edited, I think, by Lacroix; of which it is the great fault that it makes hardly any use of the additional matter just mentioned.

Montucla is an admirable historian when he is writing from his own direct knowledge: it is a sad pity that he did not tell us when he was depending on others. We are not to trust a quarter of his book, and we must read many other books to know which quarter. The fault is common enough, but Montucla's good three-quarters is so good that the fault is greater in him than in most others: I mean the fault of not acknowledging; for an historian cannot read everything. But it must be said that mankind give little encouragement to candour on this point. Hallam, in his *History of Literature*, states with his own usual instinct of honesty every case in which he depends upon others: Montucla does not. And what is the consequence? Montucla is trusted, and believed in, and cried up in the bulk; while the smallest talker can lament that Hallam should be so unequal and apt to depend on others, without remembering to mention that Hallam himself gives the information. As to a universal history of any great subject being written entirely upon primary knowledge, it is a thing of which the possibility is not yet proved by an example. Delambre attempted it with astronomy, and was removed by death before it was finished to say nothing of the gaps he left.

Montucla was nothing of a bibliographer, and his descriptions of books in the first edition were insufficient. The Abbé Rive fell foul of him, and, as the phrase is, gave it him. Montucla took it with great good humour, tried to mend, and, in his second edition, wished his critic had lived to see the *vernis de bibliographe* which he had given himself.

I have seen Montucla set down as an *esprit fort*, more than once: wrongly, I think. When he mentions Barrow's address to the Almighty, he adds, "On voit, au reste, par là, que Barrow étoit un pauvre philosophe; car il croyait en l'immortalité de l'âme, et en une Divinité autre que la nature universelle." This is a sneer, not an expression of opinion. In the book of mathematical recreations which Montucla constructed upon that of Ozanam, and Ozanam upon that of Van Etten, now best known in England by Hutton's similar treatment of Montucla, there is an amusing chapter on the quadrators. Montucla refers to his own anonymous book of 1754 as a curious book published by Jombert.

Antinewtonianismus. By Cælestino Cominale, M.D. Naples, 1754 and 1756, 2 vols. 4to.

The first volume upsets the theory of light; the second vacuum, vis inertiæ, gravitation, and attraction. I confess I never attempted these big Latin volumes, numbering 450 closely-printed quarto pages. The man who slays Newton in a pamphlet is the man for me. But I will lend them to anybody who will give security, himself in £500, and two sureties in £250 each, that he will read them through, and give a full abstract; and I will not exact security for their return. I have never seen any mention of this book: it has a printer, but not a publisher, as happens with so many unrecorded books.

1755. The French Academy of Sciences came to the determination not to examine any more quadratures or kindred problems. This was the consequence, no doubt, of the publication of Montucla's book: the time was well chosen; for that book was a full justification of the resolution. The Royal Society followed the same course, I believe, a few years afterwards. When our Board of Longitude was in existence, most of its time was consumed in listening to schemes, many of which included the quadrature of the circle. It is certain that many quadrators have imagined the longitude problem to be connected with theirs: and no doubt the notion of a reward being offered by Government for a true quadrature is a result of the reward offered for the longitude. Let it also be noted that this longitude reward was not a premium upon excogitation of a mysterious difficulty. The legislature was made to know that the rational hopes of the problem were centered in the improvement of the lunar tables and the improvement of chronometers. To these objects alone, and by name, the offer was directed; several persons gained rewards for both; and the offer was finally repealed.

Fundamentalis Figura Geometrica, primas tantum lineas circuli quadraturæ possibilitatis ostendens. By Niels Erichsen (Nicolaus Ericius), shipbuilder, of Copenhagen. Copenhagen, 1755, 12mo.

The quadrature is not worth notice. Erichsen is the only squarer I have met with who has distinctly asserted the particulars of that reward which has been so frequently thought to have been offered in England. He says that in 1747, the Royal Society, on the second of June, offered to give a large reward for the quadrature of the circle and a true explanation of magnetism, in addition to £30,000 previously promised for the same. I need hardly say that the Royal Society had not £30,000 at that time, and would not, if it had had such a sum, have spent it on the circle, nor on magnetic theory; nor would it have coupled the two things. On this book see *Notes and Queries,* 1st S., xii. 306. Perhaps Erichsen meant that the £30,000 had been promised by the Government, and the addition by the Royal Society.

Theoria Philosophiæ Naturalis redacta ad unicam legem virium in natura existentium. Editio *Veneta* prima. By Roger Joseph Boscovich. Venice, 1763, 4to.

The first edition is said to be of Vienna, 1758. This is a celebrated work on the molecular theory of matter, grounded on the hypothesis of spheres of alternate attraction and repulsion. Boscovich was a Jesuit of varied pursuit. During his measurement of a degree of the meridian, while on horseback or waiting for his observations, he composed a Latin poem of about five thousand verses on eclipses, with notes, which he dedicated to the Royal Society: *De Solis et Lunæ defectibus;* London, Millar and Dodsley, 1760, 4to.

Traité de paix entre Des Cartes et Newton, *précédé* des vies littéraires de ces deux chefs de la physique moderne.... By Aimé Henri Paulian. Avignon, 1763, 12mo.

I have had these books for many a year without feeling the least desire to see how a lettered Jesuit would atone Descartes and Newton. On looking at my two volumes, I find that one contains nothing but the literary life of Des Cartes; the other nothing but the literary life of Newton. The preface indicates more: and Watt mentions *three* volumes. I dare say the first two contain all that is valuable. On looking more attentively at the two volumes, I find them both readable and instructive; the account of Newton is far above that of Voltaire, but not so popular. But he should not have said that Newton's family came from Newton in Ireland. Sir Rowland Hill gives fourteen *Newtons* in Ireland: twice the number of the cities that contended for the birth of Homer may now contend for the origin of Newton, on the word of Father Paulian.

Philosophical Essays, in three parts. By R. Lovett, Lay Clerk of the Cathedral Church of Worcester. Worcester, 1766, 8vo.

The electrical philosopher: containing a new system of physics founded upon the principle of an universal Plenum of elementary fire.... By R. Lovett. Worcester, 1774, 8vo.

Mr. Lovett was one of those ether philosophers who bring in elastic fluid as an explanation by imposition of words, without deducing any one phenomenon from what we know of it. And yet he says that attraction has received no support from geometry; though geometry, applied to a particular law of attraction, had shown how to predict the motions of the bodies of the solar system. He, and many of his stamp, have not the least idea of the confirmation of a theory by accordance of deduced results with observation posterior to the theory.

Lettres sur l'Atlantide de Platon, et sur l'ancien Histoire de l'Asie, pour servir de suite aux lettres sur l'origine des Sciences, addressées à M. de Voltaire, par M. Bailly. London and Paris, 1779, 8vo.

I might enter here all Bailly's histories of astronomy. The paradox which runs through them all, more or less, is the doctrine that astronomy is of immense antiquity, coming from some forgotten source, probably the drowned island of Plato, peopled by a race whom Bailly makes, as has been said, to teach us everything except their existence and their name. These books, the first scientific histories which belong to readable literature, made a great impression by power of style: Delambre created a strong reaction, of injurious amount, in favour of history founded on contemporary documents, which early astronomy cannot furnish. These letters are addressed to Voltaire, and continue the discussion. There is one letter of Voltaire, being the fourth, dated Feb. 27, 1777, and signed "le vieux malade de Ferney, V. puer centum annorum." Then begin Bailly's Letters, from January 16 to May 12, 1778. From some ambiguous expressions in the Preface, it would seem that these are fictitious Letters, supposed to be addressed to Voltaire at their dates. Voltaire went to Paris Feb. 10, 1778, and died there May 30. Nearly all this interval was his closing scene, and it is very unlikely that Bailly would have troubled him with these Letters.

An inquiry into the cause of motion, or a general theory of physics. By S. Miller. London, 1781, 4to.

Newton all wrong: matter consists of two kinds of particles, one inert, the other elastic and capable of expanding themselves *ad infinitum.*

Method to discover the difference of the earth's diameters; proving its true ratio to be not less variable than as 45 is to 46, and shortest in in its pole's axis 174 miles....likewise a method for fixing an universal standard for weights and measures. By Thomas Williams. London, 1788, 8vo.

Mr. Williams was a paradoxer in his day, and proposed what was, no doubt, laughed at by some. He proposed the plan which the French—independently of course—carried into effect a few years after. He would have the 52nd degree of latitude divided into 100,000 parts, and each part a geographical yard. The geographical tun was to be the cube of the geographical yard filled with sea-water taken some leagues from land. All multiples and subdivisions were to be decimal.

I was beginning to look up those who had made similar proposals, when a learned article on the proposal of a metrical system came under my eye in the *Times* of Sept. 15, 1863. The author cites Mouton, who would have the minute of a degree divided into 10,000 *virgulæ;* James Cassini, whose foot was to be six thousandths of a minute; and Paucton, whose foot was the 400,000th of a degree. I have verified the first and third statements: surely the second ought to be the *six-thousandth.*

An inquiry into the Copernican system.... wherein it is proved, in the clearest manner, that the earth has only her diurnal motion.... with an attempt to point out the only true way whereby mankind can receive any real benefit from the study of the heavenly bodies. By John Cunningham. London, 1789, 8vo.

The "true way" appears to be the treatment of heaven and earth as emblematical of the Trinity.

Cosmology. An inquiry into the cause of what is called gravitation or attraction, in which the motions of the heavenly bodies, and the preservation and operations of all nature, are deduced from an universal principle of efflux and reflux. By T. Vivian, vicar of Cornwood, Devon. Bath, 1792, 12mo.

Attraction, an influx of matter to the sun; centrifugal force, the solar rays; cohesion, the pressure of the atmosphere. The confusion about centrifugal *force,* so called, as demanding an external agent, is very common.

## No. IX. 1792—1802.

The Commentaries of Proclus. Translated by Thomas Taylor. London, 1792, 2 vols. 4to.

The reputation of "the Platonist" begins to grow, and will continue to grow. The most authentic account is in the *Penny Cyclopædia,* written by one of the few persons who knew him well, and one of the fewer who possess all his works. At page lvi. of the Introduction is Taylor's notion of the way to find the circumference. It is not geometrical, for it proceeds on the motion of a point: the words, "on account of the simplicity of the impulsive motion, such a line must be either straight or circular," will suffice to show how Platonic it is. Taylor certainly professed a kind of heathenism. D'Israeli said, "Mr. T. Taylor, the Platonic philosopher and the modern Plethon, consonant to that philosophy, professes polytheism." Taylor printed this in large type, in a page by itself after the dedication, without any disavowal. I have seen the following, Greek and translation both, in his handwriting:—"*Πας ἀγαϑος ᾑ ἀγαϑος ἐϑνικος· και πας χριστιανος ᾑ χριστιανος κακος.* Every good man, so far as he is a good man, is a heathen; and every Christian, so far as he is a Christian, is a bad man." Whether Taylor had in his head the Christian of the New Testament, or whether he drew from those members of the "religious world" who make manifest the religious flesh and the religious devil, cannot be decided by us, and perhaps was not known to himself. If a heathen, he was a virtuous one.

The principles of Algebra. By William Frend. London, 1796, 8vo. Second Part, 1799.

This algebra, says Dr. Peacock, shows "great distrust of the results of algebraical science which were in existence at the time when it was written." Truly it does: for, as Dr. Peacock had shown by full citation, it makes war of extermination upon all that distinguishes algebra from arithmetic. Robert Simson and Baron Maseres were Mr. Frend's predecessors in this opinion.

The genuine respect which I entertained for my father-in-law did not prevent my canvassing with perfect freedom his anti-algebraical and anti-Newtonian opinions, in a long obituary memoir read at the Astronomical Society in February, 1842, which was written by me. It was copied into the *Athenæum* of March 19. It must be said that if the manner in which algebra *was* presented to the learner had been true algebra, he would have been right: and if he had confined himself to protesting against the imposition of attraction as a fundamental part of the existence of matter, he would have been in unity with a great many, including Newton himself. I wish he had preferred amendment to rejection, when he was a college tutor: he wrote and spoke English with a clearness which is seldom equalled.

His anti-Newtonian discussions are confined to the preliminary chapters of his *Evening Amusements*, a series of astronomical lessons in 19 volumes, following the moon through a period of the golden numbers.

There is a mistake about him which can never be destroyed. It is constantly said that, at his celebrated trial in 1792, for sedition and opposition to the liturgy, &c., he was *expelled* the University.

He was *banished.* People cannot see the difference; but it made all the difference to Mr. Frend. He held his fellowship and its profits till his marriage in 1808, and was a member of the University and of its Senate till his death in 1841, as any Cambridge Calendar up to 1841 will show. That they would have expelled him if they could, is perfectly true; and there is a funny story—also perfectly true—about their first proceedings being under a statute which would have given the power, had it not been discovered during the proceedings that the statute did not exist. It had come so near to existence as to be entered into the Vice-Chancellor's book for his signature, which it wanted, as was not seen till Mr. Frend exposed it: in fact, the statute had never actually passed.

There is an absurd mistake in Gunning's *Reminiscences of Cambridge.* In quoting a passage of Mr. Frend's pamphlet, which was very obnoxious to the existing government, it is printed that the poor market-women complained that they were to be *scotched* a quarter of their wages by taxation; and attention is called to the word by its being three times printed in italics. In the pamphlet it is "sconced"; that very common old word for fined or mulcted.

Lord Lyndhurst, who has just passed away under a load of years and honours, was Mr. Frend's private pupil at Cambridge. At the time of the celebrated trial, he and two others amused themselves, and vented the feeling which was very strong among the undergraduates, by chalking the walls of Cambridge with "Frend for ever." While thus engaged in what, using the term legally, we are probably to call his first publication, he and his friends were surprised by the proctors. Flight and chase followed of course: Copley and one of the others escaped; the third, whose name I forget, but who afterwards, I have been told, was a bishop, was captured and impositioned. Looking at the Cambridge Calendar to verify the fact that Copley was an undergraduate at the time, I find that there are but two other men in the list of honours in his year, whose names are now widely remembered. And they were both celebrated schoolmasters; Butler of Harrow, and Tate of Richmond.

A treatise on the sublime science of heliography, satisfactorily demonstrating our great orb of light, the sun, to be absolutely no other than a body of ice! Overturning all the received systems of the universe hitherto extant; proving the celebrated and indefatigable Sir Isaac Newton, in his theory of the solar system, to be as far distant from the truth, as any of the heathen authors of Greece or Rome. By Charles Palmer, Gent. London, 1798, 8vo.

Mr. Palmer burned some tobacco with a burning glass, saw that a lens of ice would do as well, and then says—

"If we admit that the sun could be removed, and a terrestrial body of ice placed in its stead, it would produce the same effect. The sun is a crystaline body receiving the radience of God, and operates on this earth in a similar manner as the light of the sun does when applied to a convex mirror or glass."

The mathematical and philosophical works of the Right Rev. John Wilkins....In two volumes. London, 1802, 8vo.

This work, or at least part of the edition—all for aught I know—is printed on wood; that is, on paper made from wood-pulp. It has a rough surface, and when held before a candle is of very unequal transparency. There is in it a reprint of the works on the earth and moon. The discourse on the possibility of going to the moon, in this and the edition of 1640, is incorporated: but from the account in the life prefixed, and a mention by D'Israeli, I should suppose that it had originally a separate title-page, and some circulation as a separate tract. Wilkins treats this subject half seriously, half jocosely; he has evidently not quite made up his mind. He is clear that "arts are not yet come to their solstice," and that posterity will bring hidden things to light. As to the difficulty of carrying food, he thinks, scoffing Puritan that he is, the Papists may be trained to fast the voyage, or may find the bread of their Eucharist "serve well enough for their *viaticum.*" He also puts the case that the story of Domingo Gonzales may be realized, namely, that wild geese find their way to the moon. It will be remembered—to use the usual substitute for, It has been forgotten—that the posthumous work of Bishop Francis Godwin of Llandaff was published in 1638, the very year of Wilkins's first edition, in time for him to mention it at the end. Godwin makes Domingo Gonzales get to the moon in a chariot drawn by wild geese, and, as old books would say, discourses fully on that head. It is not a little amusing that Wilkins should have been seriously accused of plagiarizing Godwin, Wilkins writing in earnest, or nearly so, and Godwin writing fiction. It may serve to show philosophers how very near pure speculation comes to fable. From the sublime to the ridiculous there is but a step: which is the sublime, and which the ridiculous, every one must settle for himself. With me, good fiction is the sublime, and bad speculation the ridiculous. The number of bishops in my list is small. I might, had I possessed the book, have opened the list of quadrators with an Archbishop of Canterbury, or at least with a divine who was not wholly not archbishop. Thomas Bradwardine (Bragvardinus, Bragadinus) was elected in 1348; the Pope put in another, who died unconsecrated; and Bradwardine was again elected in 1349, and lived five weeks longer, dying, I suppose, unconfirmed and unconsecrated. He squared the circle, and his performance was printed at Paris in 1494. I have never seen it, nor any work of the author, except a tract on proportion.

## No. X. 1803—1819.

Nouvelle théorie des parallèles. Par Adolphe Kircher [so signed at the end of the appendix]. Paris, 1803, 8vo.

An alleged emendation of Legendre. The author refers to attempts by Hoffman, 1801, by Hauff, 1799, and to a work of Karsten, or at least a theory of Karsten, contained in "*Tentamen novæ parallelarum theoriæ notione situs fundatæ;* auctore G. C. Schwal, Stuttgardæ, 1801, en 8 volumes." Surely this is a misprint; *eight* volumes on the theory of parallels? If there be such a work, I trust I and it may never meet, though ever so far produced.

Soluzione.... della quadratura del Circolo. By Gaetano Rossi. London, 1804, 8vo.

The three remarkable points of this book are, that the household of the Prince of Wales took ten copies, Signora Grassini sixteen, and that the circumference is $3\frac{1}{5}$ diameters. That is, the appetite of Grassini for quadrature exceeded that of the whole household (*loggia*) of the Prince of Wales in the ratio in which the semicircumference exceeds the diameter. And these are the first two in the list of subscribers. Did the author see this theorem?

An appeal to the republic of letters in behalf of injured science, from the opinions and proceedings of some modern authors of elements of geometry. By George Douglas. Edinburgh, 1810, 8vo.

Mr. Douglas was the author of a very good set of mathematical tables, and of other works. He criticizes Simson, Playfair, and others—sometimes, I think, very justly. There is a curious phrase, which occurs more than once. When he wants to say that something or other was done before Simson or another was born, he says, "before he existed, at least as an author." He seems to reserve the possibility of Simson's *pre-existence,* but at the same time to assume that he never wrote anything in his previous state. Tell me that Simson pre-existed in any other way than as editor of some pre-existent Euclid? Tell Apella!

*Philosophia Sacra, or the principles of natural Philosophy. Extracted from Divine Revelation.* By the Rev. Samuel Pike. Edited by the Rev. Samuel Kittle. Edinburgh, 1815, 8vo.

This is a work of modified Hutchinsonianism, which I have seen cited by several. Though rather dark on the subject, it seems not to contradict the motion of the earth, or the doctrine of gravitation. Mr. Kittle gives a list of some Hutchinsonians—as Bishop Horne; Dr. Stukeley; the Rev. W. Jones, author of *Physiological Disquisitions;* Mr. Spearman, author of *Letters on the Septuagint,* and editor of Hutchinson; Mr. Barker, author of *Reflexions on Learning;* Dr. Catcott, author of a work on the creation, &c.; Dr. Robertson, author of a *Treatise on the Hebrew Language;* Dr. Holloway, author of *Originals, Physical and Theological;* Dr. Walter Hodges, author of a work on *Elohim;* Lord President Forbes (ob. 1747).

*Sir Richard Phillips* (born 1768) was conspicuous in 1793, when he was sentenced to a year's imprisonment for selling Paine's *Rights of Man;* and again when, in 1807, he was knighted as Sheriff of London. As a bookseller, he was able to enforce his astronomical opinions in more ways than others. For instance, in James Mitchell's *Dictionary of the Mathematical and Physical Sciences,* 1823, 12mo., which, though he was not technically a publisher, was printed for him—a book I should recommend to the collector of works of reference—there is a temperate description of his doctrines, which one may almost swear was one of his conditions previous to undertaking the work. Phillips himself was not only an anti-Newtonian, but carried to a fearful excess the notion that statesmen and Newtonians were in league to deceive the world. He saw this plot in Mrs. Airy's pension, and in Mrs. Somerville's. In 1836, he did me the honour to attempt my conversion. In his first letter he says:—

> "Sir Richard Phillips has an inveterate abhorrence of all the pretended wisdom of philosophy derived from the monks and doctors of the middle ages, and not less of those of higher name who merely sought to make the monkish philosophy more plausible, or so to disguise it as to mystify the mob of small thinkers."

So little did his writings show any knowledge of antiquity, that I strongly suspect, if required to name one of the monkish doctors, he would have answered—Aristotle. These schoolmen, and the "philosophical trinity of gravitating force, projectile force, and void space," were the bogies of his life.

I think he began to publish speculations in the *Monthly Magazine* (of which he was editor) in July, 1817: these he republished separately in 1818. In the Preface, perhaps judging the feelings of others by his own, he says that he "fully expects to be vilified, reviled, and anathematized, for many years to come." Poor man! he was let alone. He appeals with confidence to the "impartial decision of posterity"; but posterity does not appoint a hearing for one per cent. of the appeals which are made; and it is much to be feared that an article in such a work of reference as this will furnish nearly all her materials fifty years hence. The following, addressed to M. Arago, in 1835, will give posterity as good a notion as she will probably need:—

> "Even the present year has afforded EVER-MEMORABLE examples, paralleled only by that of the Romish Conclave who persecuted Galileo. Policy has adopted that maxim of Machiavel which teaches that it is *more prudent to reward* partisans than to *persecute* opponents. Hence, a bigotted party had influence enough with the late short-lived administration [I think he is wrong as to the administration] of Wellington, Peel, &c., to confer munificent royal pensions on three writers whose sole distinction was their advocacy of the Newtonian philosophy. A Cambridge professor last year published an elaborate volume in illustration of *Gravitation*, and on him has been conferred a pension of £300 per annum. A lady has written a light popular view of the Newtonian Dogmas, and she has been complimented by a pension of £200 per annum. And another writer, who has recently published a volume to prove that the only true philosophy is that of Moses, has been endowed with a pension of £200 per annum. Neither of them were needy persons, and the political and ecclesiastical bearing of the whole was indicated by another pension of £300 bestowed on a political writer, the advocate of all abuses and prejudices. Whether the conduct of the Romish Conclave was more base for visiting with legal penalties the promulgation of the doctrines that the Earth turns on its axis and revolves around the Sun; or that of the British Court, for its craft in conferring pensions on the opponents of the plain corollary, that all the motions on the earth are 'part and parcel' of these great motions, and those again and all like them consecutive displays of still greater motions in equality of action and reaction, is A QUESTION which must be reserved for the casuists of other generations.... I cannot expect that on a sudden you and your friends will come to my conclusion, that the present philosophy of the Schools and Universities of Europe, based on faith in witchcraft, magic, &c., is a system of execrable nonsense, *by which quacks live on the faith of fools;* but I desire a free and fair examination of my Aphorisms, and if a few are admitted to be true, merely as courteous concessions to arithmetic, my purpose will be effected, for men will thus be led to think; and if they think, then the fabric of false assumptions, and degrading superstitions will soon tumble in ruins."

This for posterity. For the present time I ground the fame of Sir R. Phillips on his having squared the circle without knowing it, or intending to do it. In the *Protest* presently noted, he discovered that "the force taken as 1 is equal to the sum of all its fractions...... thus $1 = \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25}$, &c., carried to infinity."

This the mathematician instantly sees is equivalent to the theorem that the circumference of any circle is double of the diagonal of the cube on its diameter.

I have examined the following works of Sir R. Phillips, and heard of many others.

Essays on the proximate mechanical causes of the general phenomena of the Universe. 1818, 12mo.

Protest against the prevailing principles of natural philosophy, with the development of a common sense system (no date, 8vo. pp. 16).

Four dialogues between an Oxford Tutor and a disciple of the common-sense philosophy, relative to the proximate causes of material phenomena. 8vo. 1824.

A century of original aphorisms on the proximate causes of the phenomena of nature. 1835, 12mo.

Sir Richard Phillips had four valuable qualities; honesty, zeal, ability, and courage. He applied them all to teaching matters about which he knew nothing; and gained himself an uncomfortable life and a ridiculous memory.

Astronomy made plain: or only way the true perpendicular distance of the Sun, Moon, or Stars, from the earth, can be obtained. By Wm. Wood. Chatham, 1819, 12mo.

"If this theory be true, it will follow, of course, that this earth is the only one God made, and that it does not whirl round the sun, but *vice versâ* the sun round it."

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## No. XI. 1819—1825.

Historic doubts relative to Napoleon Buonaparte. London, 1819, 8vo.

This tract has since been acknowledged by Archbishop Whately and reprinted. It is certainly a paradox: but differs from most of those in my list as being a joke, and a satire upon the reasoning of those who cannot receive narrative, no matter what the evidence, which is to them utterly improbable *à priori*. But had it been serious earnest, it would not have been so absurd as many of those which I have brought forward. The next on the list is not a joke.

The idea of the satire is not new. Dr. King, in the dispute on the genuineness of Phalaris, proved with humour that Bentley did not write his own dissertation. An attempt has lately been made, for the honour of Moses, to prove, without humour, that Bishop Colenso did not write his own book. This is intolerable: anybody who tries to use such a weapon without banter, plenty and good, and of form suited to the subject, should get the drubbing which the poor man got in the Oriental tale for striking the dervishes with the wrong hand.

The excellent and distinguished author of this tract has ceased to live. I call him the Paley of our day: with more learning and more purpose than his predecessor; but perhaps they might have changed places if they had changed centuries. The clever satire above named is not the only work which he published without his name. The following was attributed to him, I believe rightly: *Considerations on the Law of Libel, as relating to Publications on the subject of Religion,* by John Search. London, 1833, 8vo. This tract excited little attention: for those who should have answered it could not. Moreover, it wanted a prosecution to call attention to it: the fear of calling such attention may have prevented prosecutions. Those who have read it will have seen why.

Voltaire Chrétien; preuves tirées de ses ouvrages. Paris, 1820, 12mo.

If Voltaire has not succeeded in proving himself a strong theist, and a strong anti-revelationist, who is to succeed in proving himself one thing or the other in any matter whatsoever? By occasional confusion between theism and Christianity; by taking advantage of the formal phrases of adhesion to the Roman Church, which very often occur, and are often the happiest bits of irony in an ironical production; by citations of his morality, which is decidedly Christian, though often attributed to Brahmins; and so on—the author makes a fair case for his paradox, in the eyes of those who know no more than he tells them. If he had said that Voltaire was a better Christian than himself knew of, towards all mankind except men of letters, I for one should have agreed with him.

Address of M. Hoene Wronski to the British Board of Longitude, upon the actual state of the mathematics, their reform, and upon the new celestial mechanics, giving the definitive solution of the problem of longitude. London, 1820, 8vo.

M. Wronski was the author of seven quartos on mathematics, showing very great power of generalization. He was also deep in the transcendental philosophy, and had the Absolute at his fingers' ends. All this knowledge was rendered useless by a persuasion that he had greatly advanced beyond the whole world, with many hints that the Absolute would not be forthcoming, unless prepaid. He was a man of the widest extremes. At one time he desired people to see all possible mathematics in

$$Fx = A_0\Omega_0 + A_1\Omega_1 + A_2\Omega_2 + A_3\Omega_3 + \&c.,$$

which he did not explain, though there is meaning to it in the quartos. At another time he was proposing the general solution of the fifth degree by help of 625 independent equations of one form and 125 of another. The first separate memoir from any Transactions that I ever possessed was given to me when at Cambridge; the refutation (1819) of this asserted solution, presented to the Academy of Lisbon by Evangelista Torriano. I cannot say I read it. The tract above is an attack on modern mathematicians in general, and on the Board of Longitude and Dr. Young.

De Attentionis mensura causisque primariis. By J. F. Herbart. Kœnigsberg, 1822, 4to.

This celebrated philosopher maintained that mathematics ought to be applied to psychology, in a separate tract, published also in 1822: the one above seems, therefore, to be his challenge on the subject. It is on *attention,* and I think it will hardly support Herbart's thesis. As a specimen of his formulæ, let $t$ be the time elapsed since the consideration began, $\beta$ the whole perceptive intensity of the individual, $\phi$ the whole of his mental force, and $z$ the force given to a notion by attention during the time $t$. Then,

$$z=\phi(1-\varepsilon^{-\beta t}).$$

Now for a test. There is a *jactura, v,* the meaning of which I do not comprehend. If there be anything in it, my mathematical readers ought to interpret it from the formula

$$v=\frac{\pi\phi\beta}{1-\beta}\varepsilon^{-\beta t}+C\varepsilon^{-t};$$

and to this task I leave them, wishing them better luck than mine. The time may come when other manifestions of mind, besides *belief,* shall be submitted to calculation: at that time, should it arrive, a final decision may be passed upon Herbart.

The theory of the Whizgig considered; in as much as it mechanically exemplifies the three working properties of nature; which are now set forth under the guise of this toy, for children of all ages. London, 1822, 12mo. (pp. 24, B. McMillan, Bow Street, Covent Garden.)

The toy called the *whizgig* will be remembered by many. The writer is a follower of Jacob Behmen, William Law, Richard Clarke, and Eugenius Philalethes. Jacob Behmen first announced the three working properties of nature, which Newton stole, as described in the *Gentleman's Magazine,* July, 1782, p. 329. These laws are illustrated in the whizgig. There is the harsh astringent, attractive compression; the bitter compunction, repulsive expansion; and the stinging anguish, duplex motion. The author hints that he has written other works, to which he gives no clue. I have heard that Behmen was pillaged by Newton, and Swedenborg by Laplace, and Pythagoras by Copernicus, and Epicurus by Dalton, &c. I do not think this mention will revive Behmen; but it may the whizgig, a very pretty toy, and philosophical withal, for few of those who used it could explain it.

A Grammar of infinite forms; or the mathematical elements of ancient philosophy and mythology. By Wm. Howison. Edinburgh, 1823, 8vo.

A curious combination of geometry and mythology. Perseus, for instance, is treated under the head "the evolution of diminishing hyperbolic branches."

(*To be continued.*)

## CORRESPONDENCE.

### ON A NOTATION TO BE USED IN LIFE ASSURANCE COMPUTATIONS.

*To the Editor of the Assurance Magazine.*

Sir,—Perhaps it is not void of interest to the readers of the *Magazine*, to take notice of a proposal of notation in life assurance computations, which has been agreed upon last autumn by some German actuaries. I believe it is just as much felt with you as it is with us, how disagreeable it is that different symbols are used by different authors for the same expression, and different meanings are given to the same symbol by different authors. It would be very desirable to have uniform symbols for life assurance computations, and we have tried to obtain it, at least for the most common and constantly used expressions. We perfectly know that the proposed way of notation is not always so simple as we should wish it to be, but it having been our principal object to make it agree with mathematical notation, we have laid principal stress upon the functional notation, thus facilitating the use of analytical methods of computation. As far as possible we have subordinated our selection of the symbols to the notation already in use principally in Germany, but we considered it of absolute necessity to reject as a symbol for life assurance computation any letter which has a generally acknowledged meaning in mathematics, for even those mathematical forms which until now do not enter in life assurance investigations may very likely be employed as soon as our computations are becoming of a more analytical form. Thus, $\pi$ as the proportion of the diameter to the circumference of the circle, $e$ as the base of the natural logarithmic system, $d$ as the symbol of differentiation, $l$ as the abbreviation of log. nat., $i$ equal to $\sqrt{-1}$, were positively excluded. I annex a translation of the proposal, and some remarks added to it, and am,

Sir,
Yours most obediently,

*Hamburgh, July*, 1864. WILHELM LAZARUS.

### *Proposal for the adoption of uniform symbols in life assurance computations.*

It is willingly acknowledged that the want of uniformity in the symbols used in life assurance computations is exceedingly disagreeable. Every